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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,063	04/15/2005	Yoichi Mori	2004-1936A	8727

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WENDEROTH, LIND & PONACK, L.L.P.  
1030 15th Street, N.W.,  
Suite 400 East  
Washington, DC 20005-1503

EXAMINER
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NGUYEN, NGOC YEN M

ART UNIT	PAPER NUMBER
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1793

NOTIFICATION DATE	DELIVERY MODE
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07/12/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ddalecki@wenderoth.com  
coa@wenderoth.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/517,063	<b>Applicant(s)</b> MORI ET AL.	
	<b>Examiner</b> Ngoc-Yen M. Nguyen	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 9-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

Claim 1 is objected to because of the following informalities: "though" is misspelled. Appropriate correction is required.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1101524 in view of Arno (6,905,663) and further in view of either Paules (4,015,546) or Pibernat (4,397,293).

EP '524 discloses a process for treating a waste gas containing fluorine containing compound (note title). As shown in Figure 1, a waste gas 9 containing PFCs, oxidizing gases, acidic gases and CO is first passed through a spray column 1 so as to remove solids and Si compounds. The waste gas is then passed through the thermal decomposition device 3, which is also supplied with H<sub>2</sub>, O<sub>2</sub> and H<sub>2</sub>O to decompose the PFCs, oxidizing gases and CO into acidic gases and CO<sub>2</sub>. The acidic gases are removed by passage through a subsequent spray column 5, from which treated gas 10 emerges (note paragraph [0023] and the Figure). The thermal decomposition device contains an gamma-alumina packed layer as the catalyst (note paragraph [0022]).

EP '524 further teaches that as for PFC,  $H_2$  or  $H_2O$  is added in moles at least equal to the moles necessary for F atom in the PFC to be converted into HF (note paragraph [0018]).

The differences are EP '524 does not disclose (1) the step of adding water or hydrogen to the waste gas after heating the waste gas in the presence of oxygen and (2) the step of passing the exhaust gas through a detour path formed by plural plate members.

For difference (1), Arno '663 discloses a process for the abatement of semiconductor manufacturing effluents containing fluorine gas (note title).

Arno '663 teaches that thermal approaches combine reactive materials and  $F_2$  inside a reactor that is heated using fuel or electrical energy. Existing thermal units require the addition of hydrogen source/fuels such as methane or hydrogen to drive the fluorine reaction to completion, converting fluorine to HF. The by-products generated by the thermal abatement of  $F_2$  typically include hot acids that in turn require the use of a post-treatment water scrubber. The containment of hot concentration acids requires expensive materials of construction to prevent temperature enhanced corrosive attack on lines, vessels and fittings (note column 2, lines 43-58).

In order to overcome the above mentioned deficiencies, Arno '663 discloses a process for abating gaseous fluorocompounds by injecting a fluorocompound abatement medium into the fluorocompound-containing gas, wherein the fluorocompound abatement medium comprises at least one of steam (i.e. water), methane and hydrogen, optionally in further combination with a catalyst effective to

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enhance the abatement, with the proviso that when the fluorocompound abatement medium contains methane and/or hydrogen, the injection of the fluorocompound abatement medium is conducted under non-combustion conditions (note column 3, lines 23-33). As shown in Figures 1-2, the system used consists a gas preheating stage 6, in which the fluorine-containing gas 12 is flowed into the gas flow passage 24 bounded by passage wall 22 in aluminum block 14. The aluminum block 14 is formed in two half-sections 16 and 18. Each of the half sections has respective channels therein that upon mating the other half sections forms a first throughbore for passage of a water line 26 there through, and a second throughbore for installation of a cartridge heater 20 therein. The preheat stage 6 includes an extended length flow path through which the gas stream flows to the reaction stage 7 of the apparatus, while the water line 26 carries water from a suitable source for heating by the cartridge heater 20 to generate steam. The generated steam then is introduced to the gas flow passage 24 at steam entrance 30, at an intermediate section of passage. The steam then mixes and reacts with the fluorine constituents of the gas stream. The heat of the reaction is dissipated by heat exchange cooling coils 32 in cooling section 8 (note column 4, lines 28-63).

As shown in Arno '663, the reaction only take place in the intermediate section, i.e. reaction stage 7, thus, the HF is only formed in reaction stage 7 which can be immediately cooled down in section 8. The need for using expensive materials for construction for handling hot concentrated acid can be avoided.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to inject the water or hydrogen in the process of EP '524 into the

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waste gas after such waste gas has been preheated, as suggested by Arno '663, because by doing so, at least the preheat section does not require to be constructed with expensive materials that can handle hot acid.

For difference (2), Paules '546 is applied to teach that it is known in the art to use baffles in a heating zone to increase the flow path of the gas to be heated to facilitate the heat transfer, specifically as shown in Figure 7, a spiral baffle 162 extends through the heat exchange channel 160 so that the air flow is in a spiral path around the combustion chamber. The baffle 162 initially forms a relatively small helix angle, that is, the angle with a horizontal plane, and the helix angle becomes larger and constant just below the first set of discharge tubes 106a. With this arrangement the retention time of the air in the heat exchanger after its discharge into the heat exchanger 98a is increased due to the longer path provided by the baffle. Thus, preheating of the air prior to its discharge into the combustion chamber 89a is assured (note column 11, lines 19-30). The "longer path" as disclosed in Paules '546 is considered the same as the "detour path". It would have been well within the skill of the artisan to select the actual design or shape of the baffles as long as the baffles can provide the longer path to facilitate the heating of the inlet gas.

Alternatively, Pibernat '293 is applied to a heating apparatus with a heat recovery device (note claim 1). The heat recovery device comprises at least two connected casings 4A and 4B, through which heat exchange fluid such as gas or liquids is introduced (note column 2, lines 40-48). Preferably, the casings are each provided with interior baffles 18 so as to increase the path of the heat exchange fluid, such that it

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recovers a maximum of heat during its passage in the recovery apparatus (note column 2, lines 46-50). The baffles 18 as shown in Figures 1-3 are considered as the claimed "plate members" and these baffles would inherently create a detour path as required in Applicants' claims 1 and 5.

The heat exchange fluid as disclosed in Pibernat '293 is considered the same as the waste gas in EP '524.

It would have been obvious to one of ordinary in the art at the time the invention was made to include baffles in the process of EP '524, as suggested by either Paules '546 or Pibernat '293 because these baffles would maximize the heat transfer thereby minimizing energy cost.

Claims 1-8, 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arno '663 in view of EP '524 and further in view of either Paules '546 or Pibernat '293.

Arno '663 is applied as stated above.

The differences are (1) Arno '663 does not specifically disclose the presence of oxygen in the pre-heating stage 6 and (2) the step of passing the exhaust gas through a detour path formed by plural plate members.

However, Arno '663 discloses that the reaction by-products generated by the reaction between methane and fluorine gas contain 9% CO.

For difference (1), EP '524 is applied as stated above.

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EP '524 teaches that it is desired in the art to not only decompose the PFC but also to convert CO in the exhaust gas to CO<sub>2</sub> (note last chemical equation in column 3 and paragraph [0017]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add oxygen, as suggested by EP '524, to the process of Arno '663 so that carbon monoxide can be converted into carbon dioxide. Since the addition of oxygen to the exhaust gas, without adding the hydrogen source, would not form any acid, thus, the oxygen can be added any time, i.e. during the pre-heating stage or the reaction stage.

EP '524 is further applied to teach the step of removing solid and water soluble component from the exhaust gas (note paragraph [0015]).

For difference (2), Paules '546 or Pibernat '293 is applied as stated above.

Applicant's arguments and Declaration filed April 8, 2010 have been fully considered but they are not persuasive.

Applicants argue that the step of passing the exhaust gas through the detour path formed by plural plate members during the heating step should be given patentable weight.

Paules is now positively applied to teach that it is well known in the art to use baffles to increase the retention time of the gas to be heated in the heat exchanger due to its longer path (i.e. "detour path") and thereby facilitating the heating the gas.

Alternatively, Pibernat '293 is applied as stated above.



Applicants argue that the Declaration by Mr. Mori (filed April 8, 2010) shows that the technical advantages of passing the exhaust gas through a detour path formed by plural plate members during the heating step in comparison to not passing the exhaust gas through the detour path.

The Declaration has been fully considered but is found not persuasive. The use of baffles to increase the flow path and thereby the residence time of the gas to be heated is known to improve the heat transfer and more energy efficient (note Paules '546, column 1, lines 45-48 and column 11, lines 25-30; Pibernat '293, column 2, lines 54-60); thus, the improvement as shown in the Declaration is expected.

Applicants argue that EP '524 and Arno do not teach passing the fluorocompound containing gas through a detour path formed by plural plate members.

These references are not relied to teach such step. Paules '546 or Pibernat '293 is applied as stated above to teach that it is conventional in the art to use baffles to improve the heat exchange. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants argue that Paules discloses using a spiral baffle, not plate members, for the preheating of air prior to the air entering the combustion chamber.

Granted that Paules '546 uses a spiral baffle, however, Paules '546 clearly teaches that the baffle is used to increase the flow path and the residence time of the air

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in the heat exchanger, it would have been obvious to one skilled in the art to use any design or configuration of baffles as long as the intended effects are achieved. There are no unexpected results on record to show that a detour path formed by plate members performs better than a detour path formed by other baffles. Pibernat '293 is alternatively applied to teach the use of plate members as baffles.

The rejection of claim 5 is maintained for the same reasons as stated above.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/  
Primary Examiner, Art Unit 1793

nmn  
July 9, 2010